

We Claim:

- 09723585, 112800
1. A smoking article including  
a tobacco column;  
a wrapper surrounding the tobacco column; and  
5 a carbon monoxide pump including an adsorbent for adsorbing carbon  
monoxide, wherein the carbon monoxide pump is positioned with respect to  
the tobacco column so as to selectively divert carbon monoxide from main  
stream combustion products prior to inhaling by a smoker.
  - 10 2. The smoking article according to Claim 1, further including venting  
holes adjacent to the carbon monoxide pump.
  3. The smoking article according to Claim 2, wherein the venting holes  
facilitate the further diversion of carbon monoxide from main stream smoke.
  - 15 4. A carbon monoxide pump for use in a smoking article including a  
tobacco column and a wrapper surrounding the tobacco column, the carbon monoxide  
pump including:  
an adsorbent for adsorbing carbon monoxide; and  
20 a catalyst,  
wherein when placed adjacent to the tobacco column, the carbon  
monoxide pump selectively diverts carbon monoxide from main stream  
combustion products prior by adsorbing carbon monoxide and the catalyst at  
least partially oxidizes the diverted carbon monoxide to carbon dioxide prior  
25 to being inhaled by a smoker.
  5. The carbon monoxide pump according to Claim 4, wherein the catalyst  
is at least one of a transition metal, an oxide of a transition metal, and a transition  
metal and an oxide of a transition metal.
  - 30 6. The carbon monoxide pump according to Claim 5, wherein the  
transition metal is a rare earth metal.

00723585 112800

7. The carbon monoxide pump according to Claim 5, wherein the transition metal is a platinum group metal.

5 8. The carbon monoxide pump according to Claim 5, wherein the transition metal is at least one of copper, cobalt, iron, silver, nickel, their alloys, their mixtures and combinations thereof.

9. The carbon monoxide pump according to Claim 4, further including at  
10 least one additional filter element.

10. The carbon monoxide pump according to Claim 9, wherein the additional filter element is cellulose acetate.

15 11. The carbon monoxide pump according to Claim 9, wherein at least a portion of the catalyst is distributed through the additional filter element.

12. The carbon monoxide pump according to Claim 4, wherein in the vicinity of the adsorbent the concentration of carbon monoxide is increased thereby  
20 increasing the flux of carbon monoxide from the adsorbent.

13. The carbon monoxide pump according to Claim 4, wherein the adsorbing is momentary.

25 14. The carbon monoxide pump according to Claim 13, wherein the adsorbing is between about 0.1 and about 10 seconds.

15. The carbon monoxide pump according to Claim 4, wherein the adsorbent is a zeolite.

30 16. The carbon monoxide pump according to Claim 4, wherein the adsorbent is an oxide.

17. The carbon monoxide pump according to Claim 16, wherein the oxide is an oxide of at least one of silicone, aluminum, magnesium, there mixtures and there compounds.

5 18. The carbon monoxide pump according to Claim 17, wherein the oxide is a dehydrated oxide.

19. The carbon monoxide pump according to Claim 18, wherein the dehydrated oxide is an oxide of aluminum.

10 20. The carbon monoxide pump according to Claim 16, wherein the oxide is amorphous.

21. The carbon monoxide pump according to Claim 12, wherein the  
15 adsorbent is a support for the catalyst.

22. A smoking article including:  
a tobacco column;  
a wrapper surrounding the tobacco column; and  
20 a carbon monoxide pump including:  
an adsorbent for adsorbing carbon monoxide;  
a catalyst for oxidizing carbon monoxide to carbon dioxide, and  
venting holes adjacent to the adsorbent,  
wherein the carbon monoxide pump selectively diverts carbon  
25 monoxide from main stream combustion products, the catalyst at least  
partially oxidizes the carbon monoxide to carbon dioxide and the venting  
holes provide an alternative path for the diverted carbon monoxide and the  
oxidized carbon monoxide to check inhalation by a smoker.

30 23. The smoking article according to Claim 21, wherein the venting holes facilitate the further diversion of carbon monoxide from main stream smoke.

46A<sup>2</sup> 24. The smoking article according to Claim 21, wherein the catalyst is at least one of a transition metal, an oxide of a transition metal, and a transition metal and an oxide of a transition metal.

5 16D<sup>3</sup> 25. The smoking article according to Claim 24, wherein the transition metal is a rare earth metal.

26. The smoking article according to Claim 24, wherein the transition metal is a platinum group metal.

10 27. The smoking article according to Claim 24, wherein the transition metal is at least one of copper, cobalt, iron, silver, nickel, their alloys, their mixtures and combinations thereof.

15 16A<sup>3</sup> 28. The smoking article according to Claim 21, further including at least one additional filter element.

29. The smoking article according to Claim 28, wherein the additional filter element is cellulose acetate.

20 30. The smoking article according to Claim 28, wherein at least a portion of the catalyst is distributed through the additional filter element.

25 31. The smoking article according to Claim 21, wherein in the vicinity of the adsorbent the concentration of carbon monoxide is increased thereby increasing the flux of carbon monoxide from the adsorbent.

36A<sup>4</sup> 32. The smoking article according to Claim 21, wherein the adsorbing is momentary.

30 33. The smoking article according to Claim 32, wherein the adsorbing is between about 0.1 and about 10 seconds.

1bAS 34. The smoking article according to Claim 21, wherein the adsorbent is a zeolite.

35. The smoking article according to Claim 21, wherein the adsorbent is an oxide.

36. The smoking article according to Claim 35, wherein the oxide is an oxide of at least one of silicon, aluminum, magnesium, there mixtures and there compounds.

37. The smoking article according to Claim 36, wherein the oxide is a dehydrated oxide.

38. The smoking article according to Claim 37, wherein the dehydrated oxide is an oxide of aluminum.

39. The smoking article according to Claim 35, wherein the oxide is amorphous.

20 1bAb 40. The smoking article according to Claim 31, wherein the adsorbent is a support for the catalyst.

41. A method for pumping carbon monoxide from the main stream smoke of a smoking article including a tobacco column a wrapper surrounding the tobacco column, said method comprising:

positioning a carbon monoxide pump including an adsorbent for adsorbing carbon monoxide, with respect to the tobacco column so as to selectively divert carbon monoxide from main stream combustion products prior to inhaling by a smoker.

42. A method for pumping carbon monoxide from the main stream smoke of a smoking article including a tobacco column a wrapper surrounding the tobacco column, said method comprising the steps of:

providing a carbon monoxide pump including:

5                    an adsorbent for adsorbing carbon monoxide; and  
                    a catalyst,

                    wherein when place adjacent to the tobacco column, the carbon  
monoxide pump selectively diverts carbon monoxide from main stream  
combustion products prior by adsorbing carbon monoxide and the  
10                   catalyst at least partially oxidizes the diverted carbon monoxide to  
carbon dioxide prior to being inhaled by a smoker.

43. A method for pumping carbon monoxide from the main stream smoke of a smoking article including a tobacco column a wrapper surrounding the tobacco  
15                   column, said method comprising the steps of:

providing a carbon monoxide pump including:

                    an adsorbent for adsorbing carbon monoxide;  
                    a catalyst for oxidizing carbon monoxide to carbon dioxide, and  
                    venting holes adjacent to the adsorbent,

20                   wherein the carbon monoxide pump selectively diverts carbon  
monoxide from main stream combustion products, the catalyst at least  
partially oxidizes the carbon monoxide to carbon dioxide and the venting  
holes provide an alternative path for the diverted carbon monoxide and the  
oxidized carbon monoxide to check inhalation by a smoker.

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44. A method for reducing carbon monoxide in main stream smoke of a smoking article that has a tobacco column comprising:

                    positioning a carbon monoxide pump in the path of the main stream  
smoke;

30                   combusting the tobacco in the tobacco column;  
                    drawing smoke from the combusting tobacco past the carbon  
monoxide pump;

adsorbing carbon monoxide from the main stream smoke onto an adsorbent;

catalytically oxidizing carbon monoxide to carbon dioxide at the adsorbent; and

5           expressing carbon dioxide through venting holes adjacent to the adsorbent.

45.    A method for reducing carbon monoxide in main stream smoke of a smoking article that has a tobacco column comprising:

10           positioning a carbon monoxide pump in the path of the main stream smoke;

          combusting the tobacco in the tobacco column;

          drawing smoke from the combusting tobacco past the carbon monoxide pump;

15           adsorbing carbon monoxide from the main stream smoke onto an adsorbent;

          releasing the carbon monoxide from the adsorbent and expressing carbon monoxide through venting holes adjacent to the adsorbent.

20 ~~46.~~    A mouthpiece for a smoking article comprising:

          a fitting to receive a smoking article, and

          a carbon monoxide pump including an adsorbent for adsorbing carbon monoxide, wherein the carbon monoxide pump is positioned with respect to the smoking article so as to selectively divert carbon monoxide from main stream combustion products prior to inhaling by a smoker.

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an adsorbent for adsorbing carbon monoxide;  
a catalyst for oxidizing carbon monoxide to carbon dioxide, and  
venting holes adjacent to the adsorbent,  
wherein the carbon monoxide pump selectively diverts carbon  
monoxide from main stream combustion products, the catalyst at least  
partially oxidizes the carbon monoxide to carbon dioxide and the venting  
holes provide an alternative path for the diverted carbon monoxide and the  
oxidized carbon monoxide to check inhalation by a smoker.

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